



# Java on Azure: Building Spring Boot Microservices

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<https://aka.ms/spring-boot-cloud>

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# Agenda

- 
- Java at Microsoft
  - Microservices?
  - Spring Framework
  - Azure Spring Cloud

Microsoft Azure Partners for Java

Pivotal™

ORACLE®

AZUL  
SYSTEMS®

 **Red Hat**

intel®

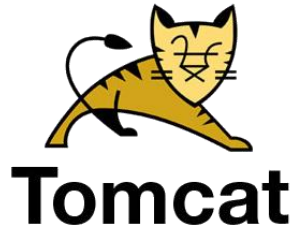
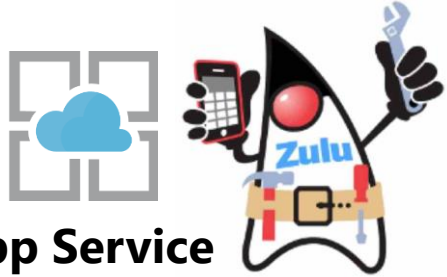
SAP®

IBM

# Microsoft Uses Java Heavily

- **Azure**
  - Services dependent on Java include Azure Databricks, HDInsight, Spring Cloud, and more.
- **LinkedIn**
  - 100s of Java microservices in production.
  - Over 60+ Java open source projects on GitHub.
- **Minecraft**
  - Hundreds of servers built in Java.
  - Client Java Edition is very popular.
- **Yammer**
  - Java in the back-end.
  - Contributors to Dropwizard Web Framework.
- **SQL Server**
  - Java now embedded out of the box.
  - Polybase data visualization and Big Data Clusters interop with Spark, Hadoop connectors.
- **Android**
  - Thousands of developers building Android applications at Microsoft.
  - New Surface phone based on Android OS.

# Azure Services Portfolio



**Azure Monitor**



**Azure DevOps**



**Blob Storage**



**Key Vault**



**Active Directory**



**Service Bus**

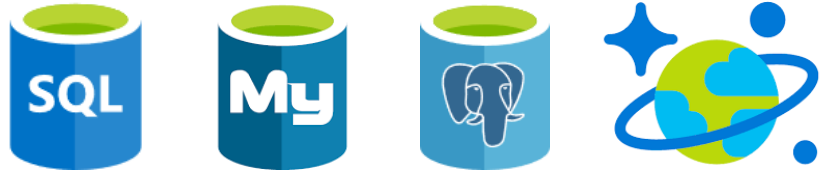


**Event Hub**



**Event Grid**

# Azure SDKs and Client Libraries for Java



Data



Storage



Cache

Security











Messaging



# Spring on Azure

[cloud.spring.io/spring-cloud-azure/](https://cloud.spring.io/spring-cloud-azure/)

 <b>Spring Cloud</b>	 <b>Spring Data</b>	 <b>Spring Security</b>	 <b>Spring Resource</b>
<b>App Configuration</b> <b>Event Hubs</b> <b>Service Bus</b> <b>Storage</b> <b>Redis</b> <b>Functions</b>	<b>SQL Database</b> <b>MySQL</b> <b>PostgreSQL</b> <b>Maria DB</b> <b>Cosmos DB</b> <ul style="list-style-type: none"><li>• SQL</li><li>• MongoDB</li><li>• Cassandra</li><li>• Gremlin</li></ul>	<b>Active Directory (AAD)</b> <b>AAD B2C</b> <b>Microsoft 365</b> <b>Microsoft Account</b>	<b>Storage</b>
 <b>R2DBC</b>		 <b>Spring Cache</b>	 <b>Spring Messaging</b>
<b>SQL Database</b> <b>PostgreSQL</b>		<b>Redis Cache</b>	<b>Service Bus</b>
			 <b>Micrometer</b>
			<b>Monitor (includes Log Analytics)</b>

# Azure Marketplace Portfolio

## Java SE



## Java EE



## Data



## Messaging



## DevOps







- Free support for all Java LTS versions
- Available for all environments, cloud and on-premise development machines
- Supported OS: Win, Linux, MacOS
- Supported Platform: Microsoft Azure, Azure Stack, DevOps Server & SQL Server
- Technical preview for non-LTS versions
- Upstream changes pushed to OpenJDK by Azul Systems

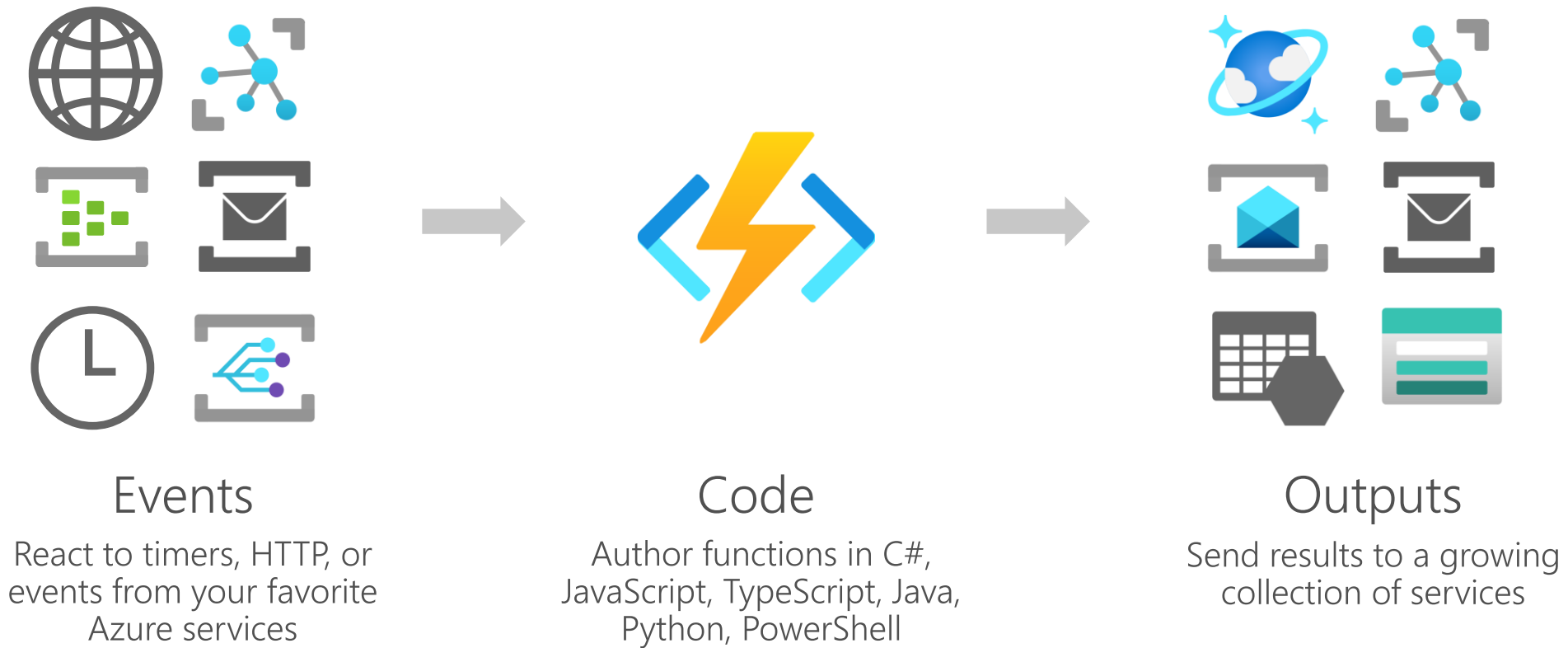


# Java on Azure - Recap

- **Free Commercial Support for Java**
  - Provided by Azul System Zulu Enterprise™ OpenJDK distribution
- **1<sup>st</sup>-class Java Support**
  - Azure Spring Cloud
  - Azure App Service
  - Azure Functions
  - Spring on Azure integrations
  - Azure Dev Spaces on AKS
  - Azure DevOps
  - Compute services (ACI, AKS, VMs, VMSS, etc.)
  - Integrations with other Azure services (Event Hubs, Service Bus, Cosmos DB, data services, etc.)
- **1<sup>st</sup>-class Java Tooling Support**
  - Continued growth of Visual Studio Code adoption by Java developers
  - Azure Toolkits (plugins) for Eclipse and IntelliJ IDEA IDEs

**Serverless ?= Microservices**

# Azure Functions: Event driven compute



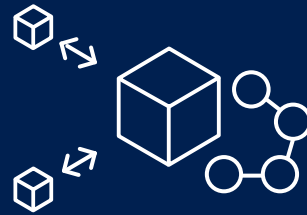
# So what are Microservices?



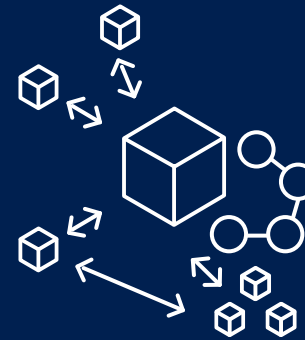
Monolith



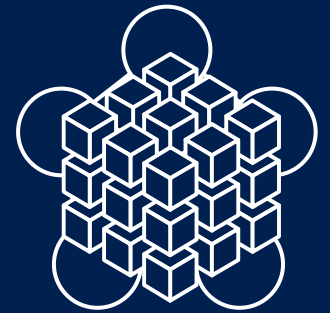
Containerized Monolith



Monolith + new  
microservices

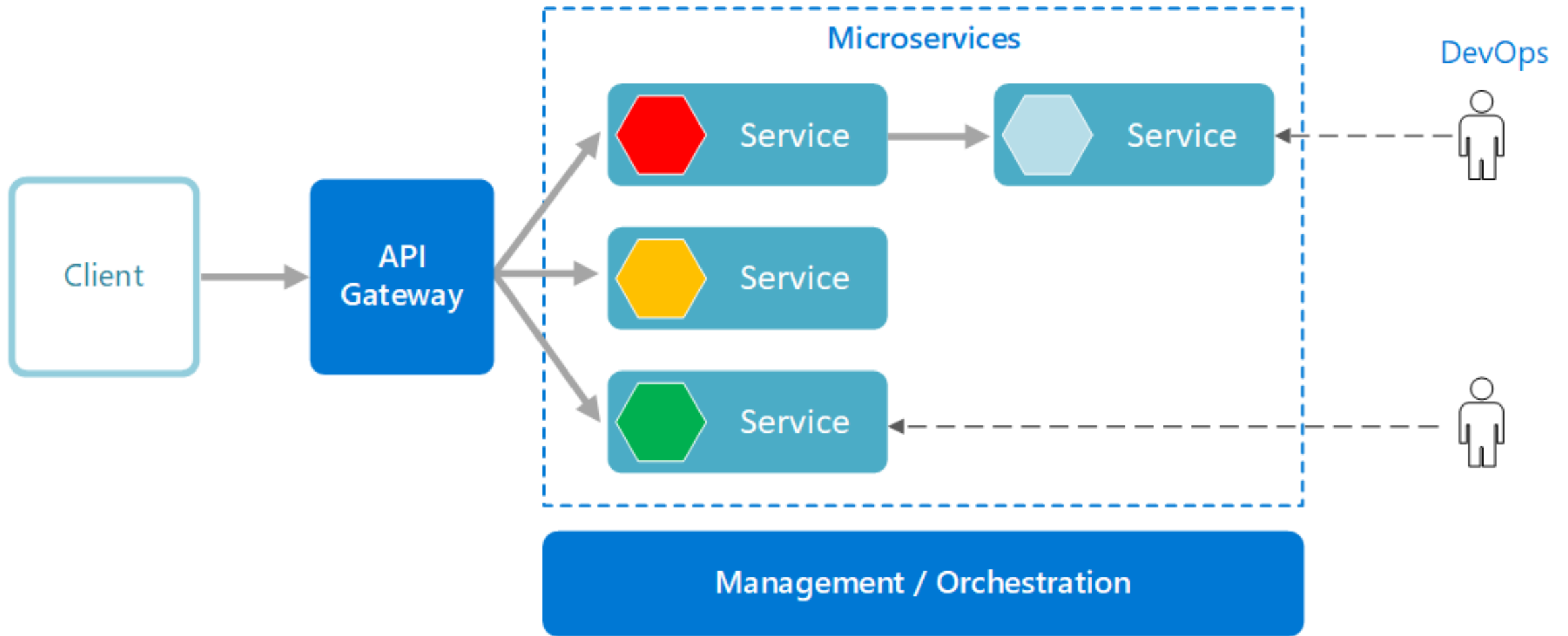


Parts of monolith  
extracted



Microservices or  
serverless  
application

# Sample microservices architecture



# Spring-based Microservices Development



## Spring Boot

BUILD ANYTHING



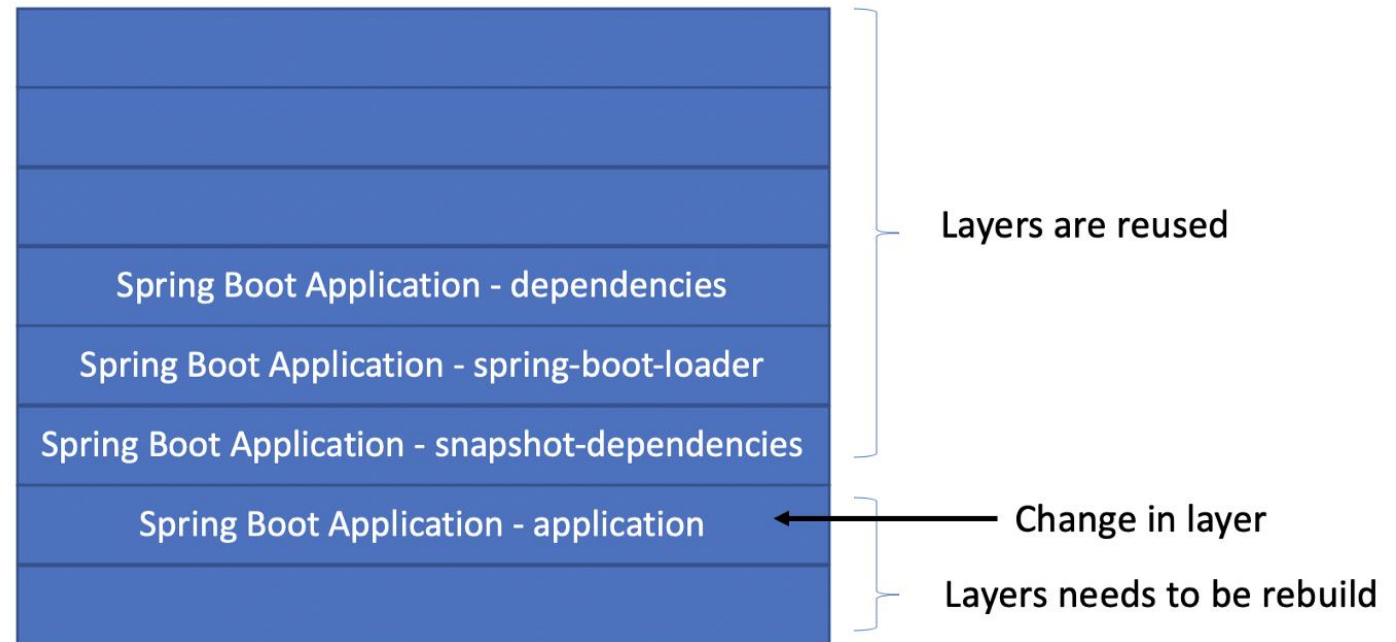
## Spring Cloud

COORDINATE ANYTHING

**Spring Boot** is designed to get you up and running as quickly as possible, with minimal upfront configuration of Spring  
**Spring Cloud** provides a set of tools that makes communication between microservices easier

# Spring boot docker enhancements

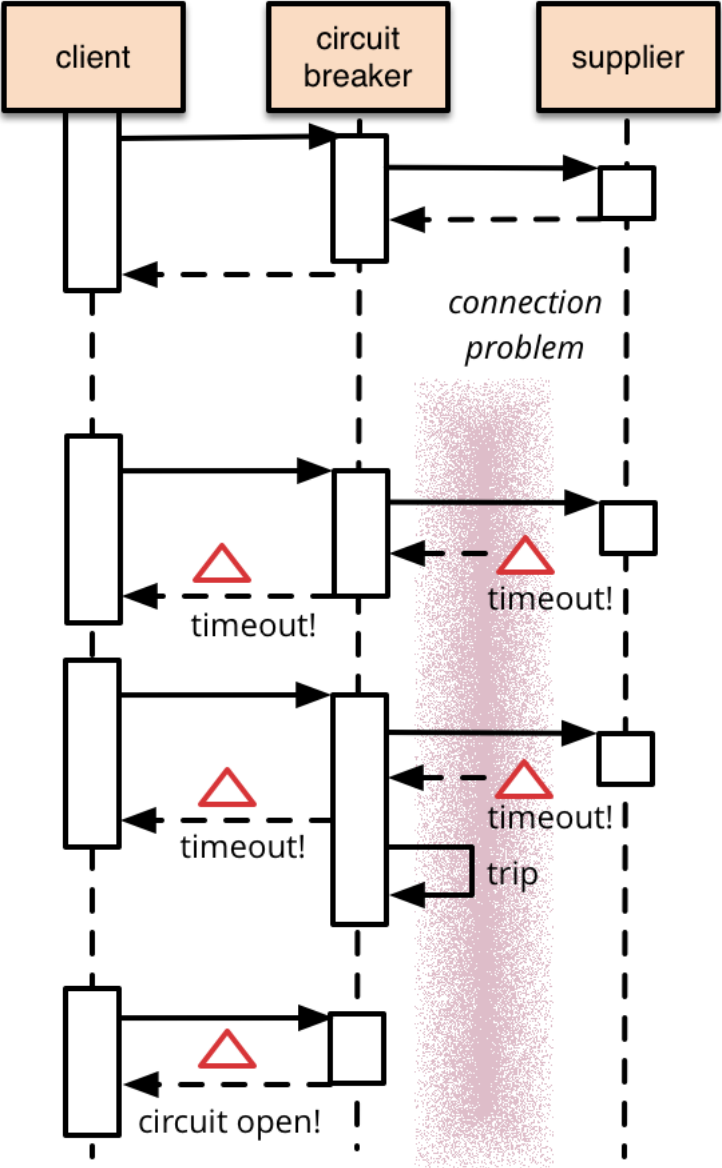
- Spring Boot version 2.3 -
- Cloud Native Buildpacks
  - Layered Jars
  - Preview on [Azure](#)
  - Backed by Cloud native foundation + Pivotal



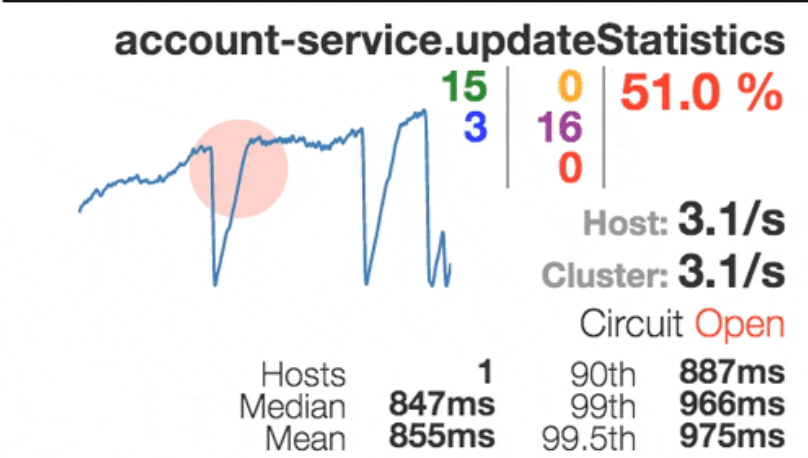
<https://docs.microsoft.com/en-gb/azure/container-registry/container-registry-tasks-pack-build>



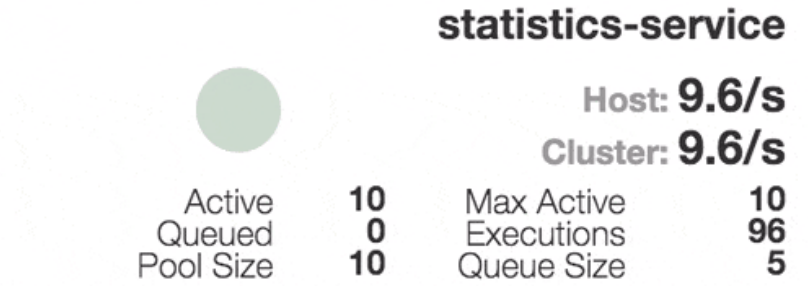
# Spring Cloud Circuit breaker pattern



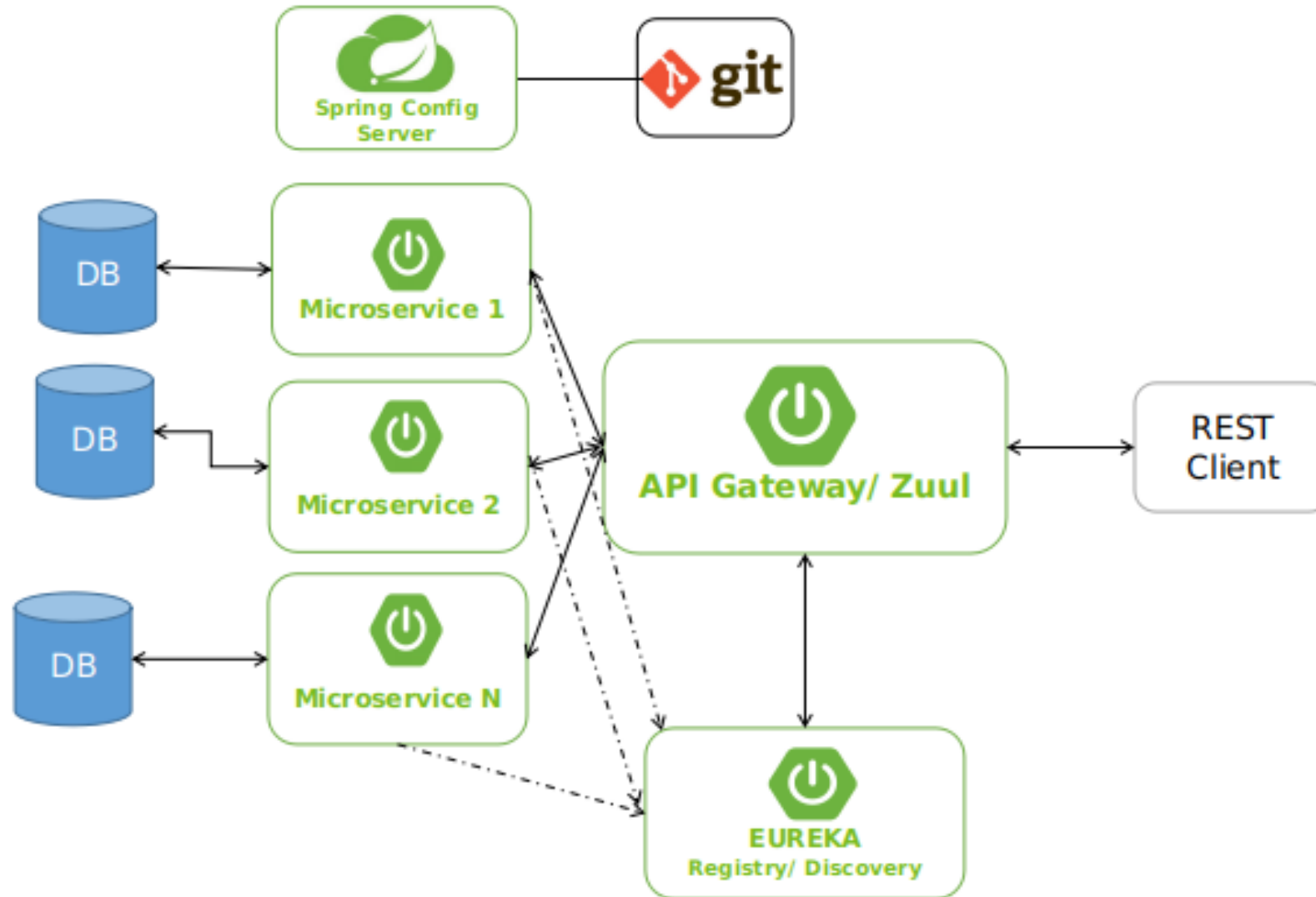
## Circuit



## Thread Pools



# Spring Cloud Netflix

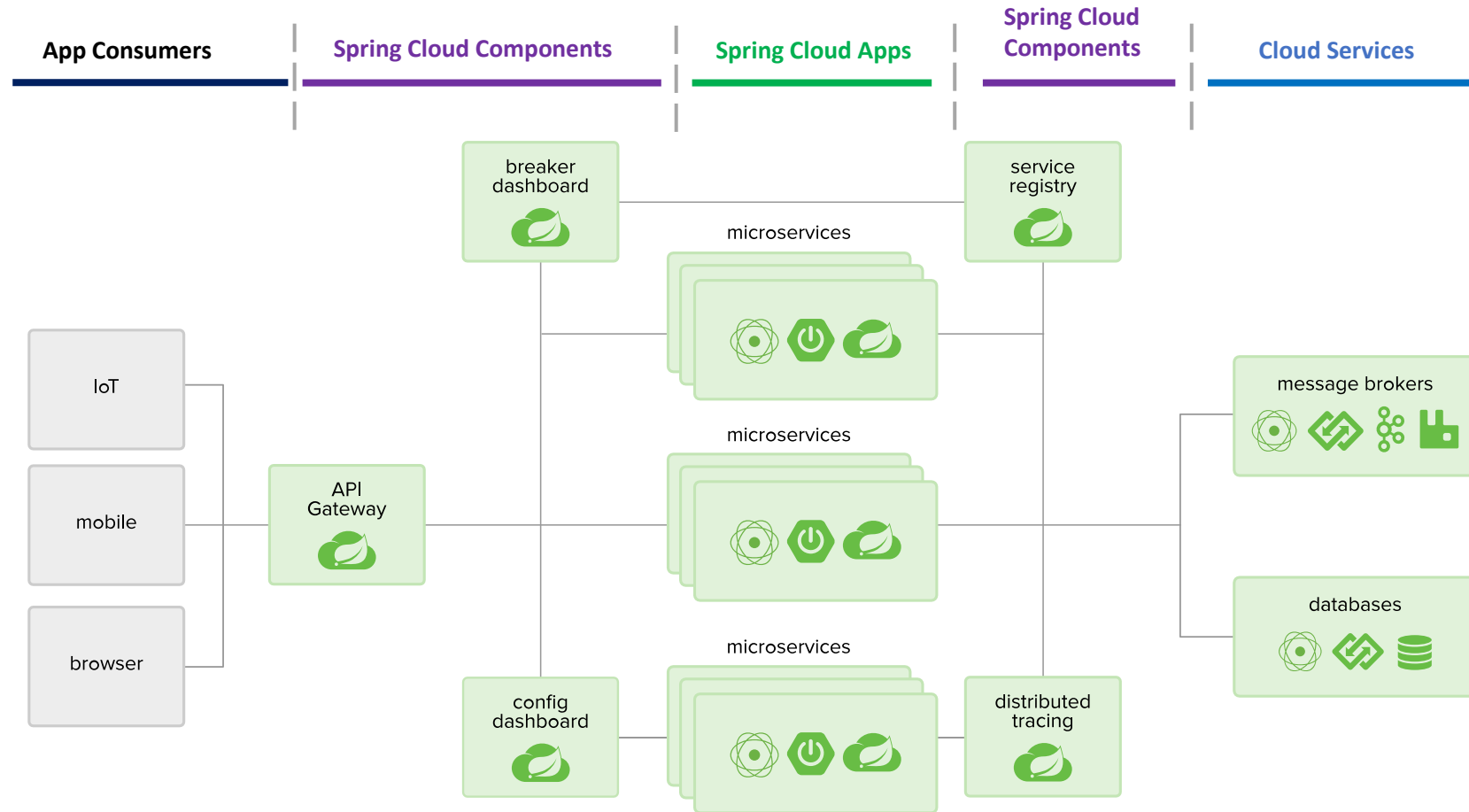


# Common Challenges

**High effort required** to manage cloud infrastructure for Spring boot applications.

Application lifecycle is **difficult to manage**.

**Painful** to troubleshoot application issues



# Azure Spring Cloud

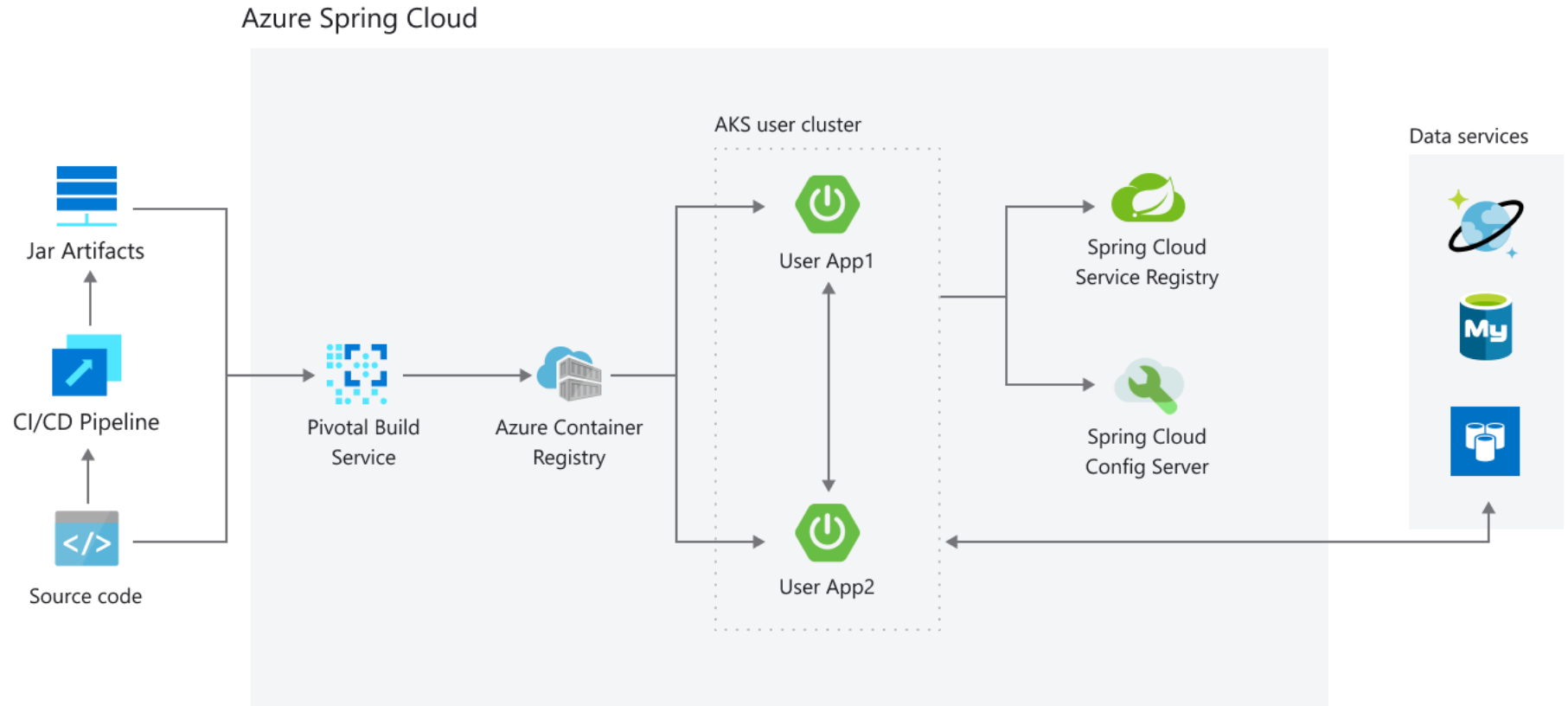
Simple app lifecycle management

Integrated CI/CD pipeline for deployment

Fully managed service

Monitoring and tracing

Scalability and Elasticity



Azure playground: <https://azure-spring-cloud.azurewebsites.net>

## Generate your Spring Cloud application



## Step 1

Configure project meta data



## Step 2

Select infrastructure modules



## Step 3

Configure microservice with Azure modules

**\*Group**

com.example

**\*Artifact**

demo

**\*Name**

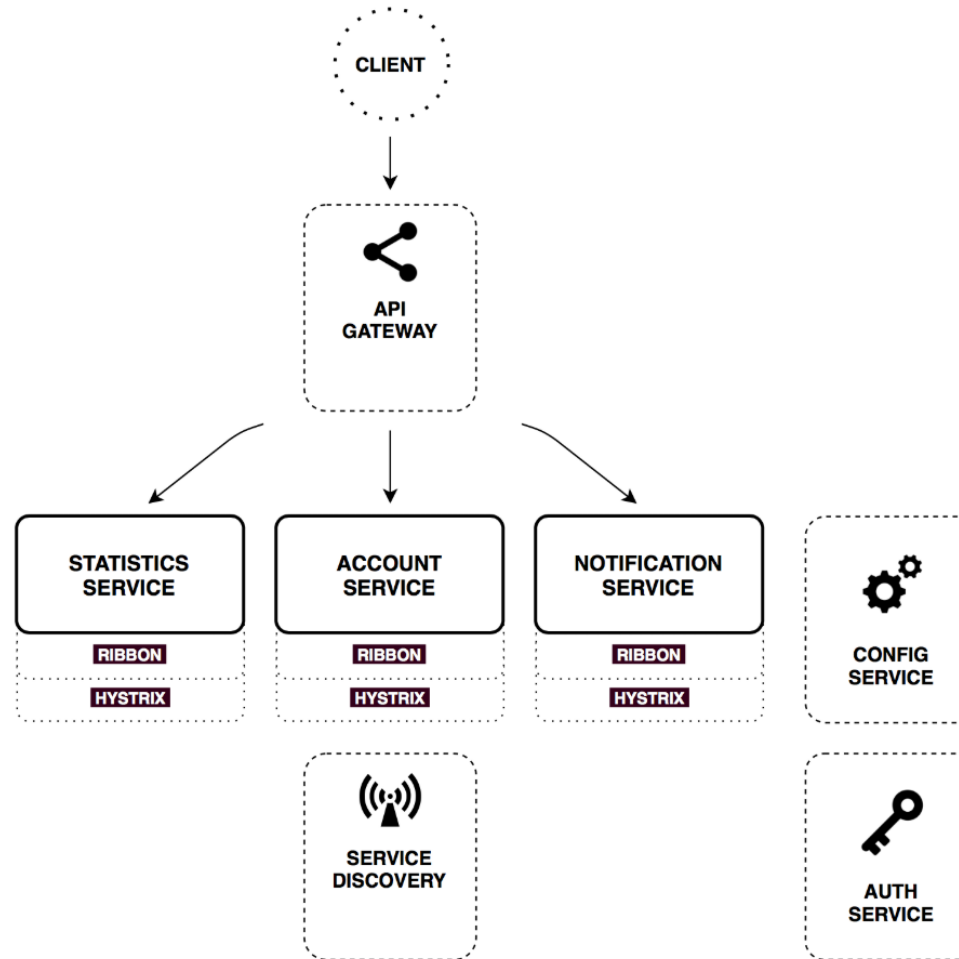
demo

**Description**

Demo project for Spring Cloud Azure

[Next](#)

# Demo



<https://github.com/Azure-Samples/azure-spring-cloud>

# PIGGY METRICS

DEMO METRICS



LAST SEEN: 07/04/2015



# Create the service app

## Azure Spring Cloud

Create

Basics \* Tags Review + create

Azure Spring Cloud provides infrastructure and application lifecycle management, with build-in tooling to monitor and diagnose daily operations for your Spring Boot application.

### Project Details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription \* ⓘ Visual Studio Enterprise

Resource group \* ⓘ Select existing... Create new

### Service Details

Name \* ⓘ Enter a name...

Location \* ⓘ West Central US

## Create App

Create App

Basics \* Review + create

Choose the amount of CPU and memory you want to allocate to your new app. Additionally increase the app instance count for more throughput and app resiliency.

App name \* ⓘ

Java environment \* ⓘ Java 8

CPU \* ⓘ 1

Memory / GB \* ⓘ 1

App Instance Count \* ⓘ 1

Add to app list

App name	Java environment	CPU	Memory/GB	Instance count
----------	------------------	-----	-----------	----------------



# Create service

```
$ az spring-cloud create -n piggymetrics -g demogroup -l westeurope
```

```
$ az configure --defaults group=demogroup name=piggymetrics
```

# Create app

```
$ az spring-cloud app create --name account-service \  
                                --cpu 2 \  
                                --memory 4 \  
                                --instance-count 3 \
```

*# By default, 1 CPU, 1GB and 1 microservice instances will be assigned.*

```
$ az spring-cloud app create --name auth-service
```

```
$ az spring-cloud app create --name gateway
```

- <<
- +

Create a resource

🏠

Home

📊

Dashboard

☰

All services

★

FAVORITES

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📁

Resource groups

🌐

App services

⚡

Function App

🗄️

SQL databases

🚀

Azure Cosmos DB

💻

Virtual machines

⚖️

Load balancers

📀

Storage accounts

🔗

Virtual networks

👤

Azure Active Directory

📈

Monitor

🛡️

Advisor

🛡️

Security center

💰

Cost management + billing

🗣️

Help + support

- <<
- Dashboard > piggymetrics-Application management

piggymetrics-Application management

Azure Spring Cloud

🔍 Search in the menu

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Application management

Config Server

Deployment management

Properties

Locks

Export template

Monitoring

Metrics

Diagnostics settings

Logs

Distributed tracing
- +

Create application

🔄

Refresh

🔍 Filter by application name...

3 items

APPLICATION NAME <div>↓↑</div>	STATUS <div>↓↑</div>	APP INSTANCE COUNT <div>↓↑</div>	DISCOVERY STATUS <div>↓↑</div>
<a href="#">Account-service</a>	RUNNING	3	UP1,DOWN2
<a href="#">auth-service</a>	RUNNING	2	UP1,DOWN1
<a href="#">gateway</a>	RUNNING	1	UP1,DOWN0

# Configure Spring Cloud Config Server

contospringcloud - Config Server

Azure Spring Cloud

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Access control (IAM)

Tags

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Apps

Config Server

Deployments

Test endpoint keys

Properties

Locks

Export template

Apply

Discard

Reset

Import settings

You can fill out below form or click the "Import settings" button to configure settings for Config Server.

Default repository

Uri	Label	Search Path	Authentication
https://github.com/Azure-Samples/piggymet✓		Separate patterns with commas.	Public

Pattern repository (Optional)

Name	Pattern	Uri	Label	Search Path	Authentication
	Separate patterns with co...			Separate search paths with...	

# Deploy and Initialize App Via Maven

- `git clone https://github.com/Azure-Samples/PiggyMetrics`
- `mvn clean install -DskipTests`
- `mvn com.microsoft.azure:azure-spring-cloud-maven-plugin:1.1.0:config`
- `mvn azure-spring-cloud:deploy`

- <<
- +

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Cost management + billing

🗣️

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- Dashboard > piggymetrics-Distributed tracing
- piggymetrics-Distributed tracing

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Distributed tracing

Edit resource

Enable

Disable

You app is connected to Application insights resource: [piggymetrics](#)

View Application Map

Application Map helps you spot performance bottlenecks or failure hotspots across all components of your distributed application.

Search

Find and explore individual telemetry items, such as page views, exceptions, or web requests.

- <<
- + Create a resource

🏠 Home

📊 Dashboard

☰ All services

★ FAVORITES

📱 All resources

📁 Resource groups

🌐 App services

⚡ Function App

🗄️ SQL databases

🌌 Azure Cosmos DB

💻 Virtual machines

⚖️ Load balancers

📀 Storage accounts

🔗 Virtual networks

🔑 Azure Active Directory

📈 Monitor

🛡️ Advisor

🛡️ Security center

💰 Cost management + billing

🗣️ Help + support

Dashboard > piggymetrics-Distributed tracing > piggymetrics-Application Map

**piggymetrics-Application Map**  
Application insights - Last hour - piggymetrics

🔄 Refresh

😊 Feedback

🔗 Suggest an idea

🔗 Learn more

❓ Troubleshooting

Last hour

Update map components

**fabrikamprod**

🔍 Filter by this node

📊 View in Analytics

📊 TOP FAILING REQUESTS BY NAME

NAME	COUNT
GET ServiceTickets/Details	600
GET Employees/Details	200
POST ServiceTickets/Create	195

Investigate failures

🌐 SLOWEST REQUESTS BY NAME

NAME	DURATION (AV...
POST ServiceTickets/Create	195.9 ms
GET Home/Index	123.3 ms
GET ServiceTickets/Index	106.9 ms

Investigate performance



- <<
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Dashboard > piggymetrics-Distributed tracing

piggymetrics-Distributed tracing

Azure Spring Cloud

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▶ Enable

☐ Disable

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🛡️ Security center

💰 Cost management + billing

🗣️ Help + support

Dashboard > piggymetrics-Distributed tracing > piggymetrics-Application Map

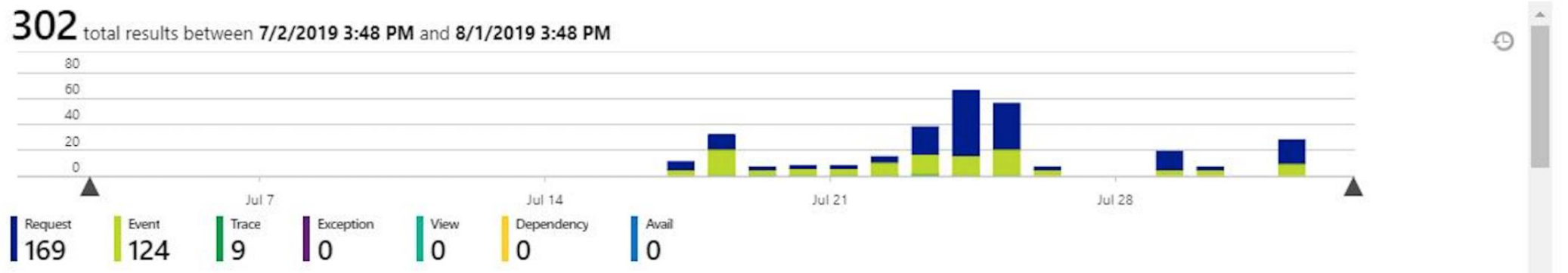
**piggymetrics-Search**  
Application insights - Last 30 days -piggymetrics

✖

🔄 Refresh   ↶ Reset   📄 Logs (Analytics)   😊 Feedback   🔗 Help

Local time : **Last 30 days**   Event types : **All**

Search ⓘ  
Place search terms here, e.g. an Operation ID or trace text (optional)



Results   **Grouped results (5)**

- 8/1/2019, 11:05:30 AM - CUSTOM EVENT**  
AppInsightsSnapshotCollectorLogs
- 8/1/2019, 10:57:38 AM - REQUEST**  
GET /favicon.ico  
Request URL host: https://azdmss-lifecycle.azurewebsites.net/ Response code: 404 Server response time: 63.47 ms
- 8/1/2019, 10:57:38 AM - REQUEST**  
GET /swagger/v1/swagger.json  
Request URL host: https://azdmss-lifecycle.azurewebsites.net/ Response code: 200 Server response time: 5.61 ms
- 8/1/2019, 10:52:30 AM - CUSTOM EVENT**  
AppInsightsSnapshotCollectorLogs
- 8/1/2019, 10:50:33 AM - CUSTOM EVENT**  
AppInsightsSnapshotUploaderLogs

- **Demos**

- Buildpacks

- Azure Spring Cloud +Redis





<https://aka.ms/spring-boot-cloud>